

Joint Policy Board for Mathematics (JPBM)
Minutes of the October 25, 2010, meeting

JPBM members:

- George Andrews (President, AMS)
- Doug Arnold (President, SIAM)
- David Bressoud (President, MAA)
- Sastry Pantula (President, ASA)
- Jim Crowley (Executive Director, SIAM)
- Don McClure (Executive Director, AMS)
- Tina Straley (Executive Director, MAA)
- Ron Wasserstein (Executive Director, ASA)
- Reinhard Laubenbacher (SIAM)
- Steve Pierson (ASA)
- Philippe Tondeur (MAA)

Other attendees:

- Daniel Goroff (OSTP)
- Deborah Lockhart (NSF)
- Ed Seidel (NSF)
- Sam Rankin (AMS)
- Miriam Quintal (SIAM/Lewis-Burke Associates)
- Dave Zook (MAA/ Baker & Daniels)

The meeting opened at 9am with introduction of members and guests.

“Data- and Compute-Driven Transformation of Modern Science”

Presentation by Edward Seidel, Assistant Director, Mathematical and Physical Sciences, NSF

Seidel said there has been a profound transformation in how science is conducted. The amount of data involved has increased extraordinarily, and the number of people collaborating on a given problem has increased as well. Sciences that were once largely driven by theory are now generating petabytes of data. Various communities (including Grand Challenge communities) have sprung up to address complex problems. But where is it going? What should our policies be?

Modern science and engineering are data- and compute-intensive and integrative. Multiscale collaborations are needed to deal with the complexity, he said. NSF must make the transition to think about science in these ways.

He gave some examples of data growth: comparative metagenomics, HD collaborations and optiportals, petascale-exascale simulation, large synoptic survey telescope (LSST). Every year we generate more data than in our entire history. But what are the methods for finding the science in all of this data? Statistics and mathematics must be at the heart of this.

Seidel pointed out the NSF’s Advisory Committee on Cyber-infrastructure (ACCI). ACCI has suggested creation of a new program in computational and data-enabled science and engineering. This is under discussion at NSF. Related to this, the NSF released a “dear colleague” letter last year entitled, “CI Framework for 21st Century Science and Engineering.” NSF is or will be supporting high-end computation, data, and visualization, MREFCs and collaborations, software tools, campus connections, and, of course, people.

Change is coming for data, he said. NSF is trying to be proactive in adjusting data policy. NSF will soon require a data management plan, subject to peer review, as a criterion for awards.

Doug Arnold pointed out the need for better training in data analysis for scientists in these fields.

Tina Straley asked if NSF could model true collaborations that would help university scientists see how these could work at their institutions. Seidel said NSF is working on integrative ideas, and also that some institutes with large scale visitor programs could serve as models as well. She also asked about NSF being able to accept and fund proposals that cross organizational boundaries but are not in response to established collaborative programs. Seidel answered that NSF is also looking at ways to do that.

Sastry Pantula mentioned data mining, uncertainty quantification, compressed sensing, and data visualization as important in the mathematical sciences. Supporting training in these areas is important. Mathematics and statistics play a bit of a “matchmaking role” between the sciences and the tools needed to understand their data.

Jim Crowley asked about sharing of data and computer code. Seidel said that some disciplines are more ready for such sharing than others. Software sharing will be encouraged in more solicitations.

Seidel said that a data management plan that is considered as part of the peer review must be included in all NSF proposals starting in January 2011. It will be a 2-page document.

Overview of NSF Division of Mathematical Sciences – Deborah Lockhart

Lockhart summarized the ways in which DMS is investing in research.

DMS Investment Philosophy

- Discover (Thematic Research)
- Connections (Interdisciplinary, Impact, Visible)
- Community (Educate through research)
- New DMS acronym THRIVE

Areas of investment:

- Disciplinary research (not discrete (not silos), but integrative)
- Interdisciplinary/infrastructure
- Institutes (Institute for Computational and Experimental Mathematics was highlighted as a news center, located at Brown University)
- Workforce

Lockhart briefly reviewed DMS budget history. In FY09, DMS received about \$98M in ARRA funds, putting the total investment over \$300M. FY10 budget is a bit under \$250M. About 72% of the budget is on single and small group awards. About 12% is spent on workforce, 10% on institutes, and 6% on other programs. (In the ARRA year, a bit more was spent (mostly on postdocs).)

The funding rate for FY10 was 29%. The annualized median award is generally increasing, and in FY10 is about \$68K.

The FY11 budget request is before Congress. NSF is currently operating on a continuing resolution. The request is for an 8.2% increase for NSF (proposed increase is 4.3% for MPS and 5.0% for DMS). All proposals must include a data management plan (on or after 1/18/11). Re-competition proposals for institutes will be due in Feb. 2011. NSF is currently working on the FY12 budget request. Work on the Math Sciences 2025 Report (NRC) is underway.

Lockhart asked for help from the JPBM communities in recruiting new program directors. There may be a need for as many as 10 people.

Doug Arnold asked about the subdividing of disciplines, whether this is a trend. Lockhart said this largely reflects the organization of DMS, and some of these programs (example: statistics, probability, and combinatorics) work together fairly closely. The impact of splitting probability and statistics was to highlight the growing importance of probabilistic methods, and the number of proposals has grown. She also said that researchers who have proposals that cut across programs should contact DMS to get advice. There is a June deadline for all proposals that do not fit in one program.

The graduate fellowship program is undergoing change, Lockhart said. The program was funded under Education and Human Resources (EHR). Beginning this year, there is funding in the disciplinary directorates, and these directorates have been brought into the management of the programs.

Dave Zook asked about impact metrics. Lockhart said that each new administration has its views of accountability. Details about the metrics are still forthcoming from the administration (Office of Management and Budget). Lockhart said EHR is working on accountability issues as the first directorate to deal with this issue that has been pressed by every administration and will be increasingly important. DMS is waiting to see how EHR's efforts play out.

Sam Rankin asked if there are many mathematicians receiving IGERT grants. These are interdisciplinary, and Lockhart said there aren't many mathematicians getting them at this time. This may be due in part because there are alternatives within DMS that are better for mathematicians. There is a directive that IGERT and GRD programs must grow at the same rate; this might hurt math which has a small number of IGERT programs.

Daniel Goroff, Assistant Director for Social, Behavioral, and Economic Sciences, Office of Science and Technology Policy (OSTP)

Goroff opened his presentation with a quote: "Science is more essential for our prosperity, our security, our health, and our environment and our quality of life than it has ever been before." *President Obama, National Academy of Sciences, April 2009*. He illustrated further the president's commitment to science through activities (most recently hosting science fair in WH), administration appointments (Nobel Laureates and NAS fellows), commitments (including 10-year doubling of basic-research funding agencies) and other statements or actions.

Goroff said there are a few questions to keep in mind:

- What does this administration value?
- Where can the priorities of the mathematics community and the administration align and reinforce one another?
- How does this administration like to work?
- Who is doing what in this Admin?

- Why is there so much more to do?

There are many challenges linked to science, technology, and innovation (ST&I). They are global in nature and complex. Examples include (but are not limited to) the economy, health, energy, climate change, national and homeland security. President Obama views these challenges as interconnected and need to be addressed together. Success requires not only applying ST&I to specific challenges but also nurturing the cross-cutting foundations (basic research institutions (research universities, national labs, nonprofits), key infrastructure (IT/broadband, high speed computing, energy, transportation, space technology), STEM education). Interconnectedness means that solutions require partnerships.

Many federal agencies are involved in this work. OSTP is responsible for policy for science and technology (analysis, recommendations, coordination with other White House offices, etc.), and science and technology for policy (independent advice for the President about S&T germane to all policy issues with which he is concerned).

Goroff reviewed the structure and people involved in this work, including NSTC and PCAST (National Science and Technology Council, President's Council of Advisors on Science and Technology). Along with these organizations, OSTP is very active, as no president has ever talked as much about science and technology. He also briefly reviewed the President's initiatives in a variety of areas, and the President's FY2011 budget proposals for science and technology. He pointed the group to the "Holdren-Orzag Letter" of July 2010, which outlines proposed FY2012 budget priorities. Goroff also summarized policy initiatives, including the open government initiative, the data.gov website, and the challenge.gov website. A number of international initiatives are in the works as well.

He highlighted the Office for Financial Research created in the Dodd-Frank Financial Regulatory Reform Bill for its uniqueness and potential game changing elements. While its director will report to the Secretary of the Treasury, he/she will be appointed by the president to a six-year fixed term and have considerable autonomy in its funding, communications with Congress, and its operations.

Reports from Washington Representatives

Sam Rankin reported on the status of funding bills. These are held up in various places in the House and Senate. The bills in play are close to the President's budget recommendation, but the process of reallocation within the appropriations committees could lead to reductions in funding. The America Competes Act is being worked in both chambers. The Senate may put a little more work in on this, but it may not get done prior to the end of this Congress.

A great many new members will need to be educated about the value of science research funding, particularly in the social and behavioral sciences. Much work will need to be done to emphasize the nature of these expenditures as investments, especially in an environment of cutting everything. The OMB has a renewed focus on metrics, recognizing the importance of providing evidence of return on investment of research.

We'll also need to think carefully about committee chair changes after the elections. There will still be some supporters of science research funding and we'll need to think strategically about leveraging these resources.

Rankin has been involved in issues related to public access of federal funded research (for example PubMed Central for NIH). There is legislation requiring this of all agencies, including NSF. This is a matter of great concern to society publishers.

Steve Pierson mentioned that the Congressman Dave Loebsack has introduced the STAT Act of 2010, a measure aimed at improving statistical literacy, in part by providing better training for teachers. He also reported on work he is doing regarding the American Community Survey (which is being threatened by a move to make it voluntary), climate change, the census autonomy bill, and World Statistics Day.

The JPBM societies were well represented at the Science and Engineering Fair in Washington, DC, this past weekend.

Dave Zook pointed out the emphasis on metrics and evidence based funding.

There was considerable discussion of open access to research papers that have been funded by federal grants. The author(s) are responsible for putting the final journal copy on the web in an online repository. The question was asked "Where is the payment to the Journals" if papers will be available on the web in journal edited form? Page charges are not done in mathematics. Also, if journals no longer exist or depend on page charges, where does research that is not federally funded appear? These policies will require a reallocation of university funding to paying page charges rather than subscribing to journals. There will be a workshop at MSRI in February on the future of mathematics journals.

World Statistics Day was this past Wednesday. There was a Congressional briefing on the Hill. Katherine Wallman, Chief Statistician of the United States and Bob Groves, Director of the Census Bureau, were among the speakers.

The Canadian government has made the long form census in Canada voluntary, in spite of the problems this causes with data quality, and in spite of the objections of statisticians in and out of the government. There is a movement within the US to do something similar to the American Community Survey (ACS), which replaced the long form in the US. The ACS is conducted annually to a sample of about 3 million American households. It guides \$1trillion in federal assistance, so high quality data is important. The ASA and others are involved in providing information to Congressional members and staff about the importance of proper methodology in

In a discussion of climate change a question was asked about who is speaking for the scientific community. How do we answer the skeptics? How do we bring scientific societies together as one voice? The deniers are getting the upper hand on issues of uncertainty.

Mathematics Awareness Month

Doug Arnold distributed copies of the poster, "Unraveling Complex Systems." Essays have been solicited and are coming in. Five primary essays are expected, with links to many other resources. Steve Strogatz is contacting other science writers to ask them to write about Math Awareness Month. Once the essays are in, the website will be ready to go up.

JPBM briefly discussed possible topics for MAM for 2012, which will be coordinated by ASA. The ASA will put together some ideas and circulate by email.

Mathematics of Planet Earth

Doug Arnold distributed a handout about the Mathematics of Planet Earth 2013 initiative, launched by the North American Mathematical Sciences institutes (in the US and Canada). Professional societies are now being asked to serve as cosponsors. The website containing the invitation is www.mpe2013.org.

JPBM discussed connecting the 2013 MAM to this initiative. The initiative is very broad, and perhaps too broad for the MAM poster, but can be tied into the poster and theme in some way.

Tina Straley suggested there should be follow up with colleges to see how MAM is used and to see how effective the program is. All of our information at this point is anecdotal. We need to hear from the community, she said. A group of people representing each of the societies could be put together to determine who to survey and what to ask. We could ask people at department chairs meetings at JMM or JSM.

JPBM agreed to align its MAM in 2013 with Mathematics of Planet Earth.

MAA and SIAM are already listed as partners. ASA and AMS are considering it and are likely to agree.

Communication Award

David Bressoud reported for the Award Committee. Nick Falacci and Cheryl Heuton, the creators of Numb3rs, have accepted the award, and will tape an acceptance speech to show at the meeting. Bressoud has suggested that Keith Devlin and/or Gary Lorden, mathematicians who assisted with the program, receive the award on the behalf of Falacci and Heuton at the JMM. He has made this suggestion to all involved, and is waiting for a response.

Tina Straley pointed out that the Award Committee had recommended that the attendees had to be present in order to receive the award. She said this was quite contrary to the intent of the award, and would have the unintended consequence of restricting the award to mathematicians (who would be attending JMM). She noted that the award is largely intended for non-mathematicians. Also, international figures who might be eligible for the award are not likely to be able to attend JMM.

The committee's recommendation had been rejected by email vote, and there was no additional support for the recommendation.

It is not clear how much impact it has, and it was agreed additional work is needed to promote the award. The math community is largely unaware of the award. Additional publicity regarding what the awardees did to receive the award was recommended. Each society should work hard to promote the award. (An article after the award is made should be in Notices, Amstat News?)

Report from ICM

Philippe Tondeur, George Andrews, Doug Arnold, Sastry Pantula, and Don McClure attended the 2010 ICM meeting in Hyderabad, India. McClure reported that the 2014 ICM will be in Seoul. Korea is providing substantial support for this activity, including travel for some mathematicians from developing countries. IMU has established a “stable office,” a staffed office in Berlin. The support mechanisms for mathematicians in developing countries have been reorganized.

Doug Arnold reported on the working group of journal ranking and pricing. He made a proposal to the IMU committee on electronic publication and to the general assembly that the IMU and ICIAM should collaborate to develop a method for a coarse rating of journals. The resolution passed, and a committee has been appointed and is at work. The impact factor, Arnold noted, is compromised and flawed.

There was also a discussion of journal pricing and the roles of international mathematical organizations. Ways to combine the accessibility of arXiv with the prestige and quality control of a good peer reviewed journal are being considered. The primary idea is an “overlay journal” for arXiv.

National Academies Report, “New Biology for the 21st Century”

Reinhard Laubenbacher noted that there were no computational sciences people involved in this report. The report consistently points out the need for computational science in advancing biology. SIAM has prepared a white paper (which has been distributed to JPBM) to address how mathematics can help. There is a great opportunity for mathematics in this area.

European Mathematics Society Committee on Math Awareness Report

This group met in Portugal last month. Laubenbacher participated in this meeting, as did Barry Cipra (science writer, previous winner of the JPBM Communication Award). There was discussion about the activities that had taken place and how to encourage other countries to take part. Much infrastructure has been built in Germany to promote mathematics awareness. A new mathematics museum in Geissen, near Frankfurt, had 140,000 visitors last year. There is a traveling Mathematics and Art exhibit that was created in Oberwolfach. It was also noted that a mathematics museum is being created in New York City.

Update on Calculus Survey

David Bressoud reported on a large scale survey to 530 colleges and universities regarding calculus. Two hundred eighty-two have agreed to participate. There are actually five surveys, some of faculty and some of students. Student surveys will be linked to final course grades. There are about 12000 students in the database at this point. Results of data analysis are expected by next summer. This is the first

stage of a five year project. In the second phase, in depth case studies of eight highly successful programs will be undertaken.

Status of next CUPM Curriculum Guide

Smaller college programs in particular are looking for updated guidance and support from an updated curriculum. Committees working on the guide will meet at JMM. Recommendations will be developed over the next two years.

Society reports and issues

Don McClure reported on the AMS involvement with the AWIS AWARDS project. AMS members were contacted directly about being involved, without the initial involvement of AMS leadership. The AMS Council has identified three volunteers to serve as a liaison with the project. These volunteers attended the workshop held in DC last summer, and continue to be involved in the project, but the AMS has not formed an official "action group."

Jim Crowley said that SIAM's experience is similar. Tina Straley said the MAA was asked to appoint volunteers. The role of the Joint Committee on Women in Mathematics (JCW) in this project is not clear.

Each of the four organizations is taking its own approach to addressing the issues raised in the AWARDS workshop to improve fairness in the awarding process.

A discussion ensued regarding the JCW. The committee meets but it is not clear who drives the agenda or whether any results are achieved. Members are confused about the purpose of the committee.

A study group consisting of representatives from each of the individual societies' committees on women in the profession or committees on the profession could be formed to see what synergies are possible and what the ongoing function of the JCW could be. Straley suggested that the charge to the study group or task force be to suggest how the JCW can complement the work of the individual societies in this area. But Straley pointed out that there is no entity to whom the JCW reports. The executive directors are tasked with following up on this issue.

Don McClure asked about the individual societies' rules regarding posting of articles in institutional repositories. Generally authors are allowed to post on their own websites.